CLAIMS

1. A high power laser source for generating a stable exit beam at a given wavelength, said laser source comprising a laser diode and guide means for conducting a laser beam, said laser diode including a reflecting front facet and said guide means including at least one reflector, *wherein*
- said reflector has a reflectivity R_{FBG}, centered at the desired wavelength of said exit beam,
- said front facet has a reflectivity R_F towards said guide means,
- said reflectivities R_{FBG} and R_F being selected to achieve a predetermined relative feedback

$$r_{FB} = k * R_{FBG} / R_F > 1,$$

k being a factor determined by the coupling efficiency within said guide means.

2. The laser source according to claim 1, *wherein*
- the relative feedback r_{FB} is between 5 and 10.

3. The laser source according to claim 1, *wherein*
- the laser source is uncooled.

4. The laser source according to claim 1, *wherein*
- the reflectivity R_F of the laser's front facet towards the guide means is less than 10%.

5. The laser source according to claim 4, *wherein*
- the reflectivity R_F of the laser's front facet towards the guide means is less than 1%.

6. The laser source according to claim 1, *wherein*
- the FWHM reflectivity bandwidth of the reflector corresponds to the equivalent of at least 5 longitudinal Fabry-Perot internal modes of the laser diode.

7. The laser source according to claim 6, *wherein*
- the FWHM reflectivity bandwidth of the reflector corresponds to the equivalent of at least 20 – 40 longitudinal Fabry-Perot internal modes of the laser diode.

8. The laser source according to claim 1, *wherein*
- the reflector is a grating integrated within the guide means.

9. The laser source according to claim 8, *wherein*
- the reflector is a fiber Bragg grating grating within a fiber, the latter forming part of the guide means.

10. The laser source according to claim 1, *wherein*
- the guide means includes a waveguide consisting of or comprising silicon nitride (Si_3N_4), silica (SiO_2), or silicon (Si).

11. The laser source according to claim 8, *wherein*
- the grating is an apodized grating.

12. The laser source according to claim 1, *wherein*
- at least two gratings are provided, at least one of them integrated within the guide means.

13. The laser source according to claim 12, *wherein*
- at least of the provided gratings is a fiber Bragg grating.

14. The laser source according to claim 12, *wherein*
- the two or more gratings have different central wavelengths by design.

15. The laser source according to claim 12, *wherein*
- the two or more gratings are similar or identical by design, but have different central wavelengths generated by applying mechanical and/or thermal stress.

16. The laser source according to claim 8, *wherein*
- the grating exhibits a non-uniform reflection characteristic resulting in a predetermined filter function.

17. The laser source according to claim 16, *wherein*
- the preselected filter function has a flat-top shape.

18. The laser source according to claim 16, *wherein*
- the preselected filter function has a linear shape.

19. The laser source according to claim 16, *wherein*
- the grating is a chirped grating resulting in a preselected chirped filter function shape.

20. The laser source according to claim 16, *wherein*
- the grating is an apodized grating resulting in a filter function shape with suppressed side-band maxima.

21. The laser source according to claim 12, *wherein*
- at least one of the gratings is a chirped and apodized grating resulting in a preselected chirped filter function shape with suppressed side-band maxima.

22. The laser source according to claim 1, *wherein*

- an electronic dither is superimposed on an injection current of the laser diode for improving the power stability of the laser exit beam.

23. The laser source according to claim 1, *wherein*

- the laser is a semiconductor diode laser.

24. The laser source according to claim 23, *wherein*

- the laser is an InGaAs quantum well diode laser.

25. The laser source according to claim 1, *wherein*

- the laser guide means comprises a polarization-maintaining or a non-polarization-maintaining optical fiber.

26. The laser source according to claim 1, *wherein*

- the guide means includes means for directing the laser beam into an optical fiber.

27. The laser source according to claim 25, *wherein*

- the means for directing the laser beam into the optical fiber includes beam collimating or focusing means attached to or integrated into said optical fiber.

28. A method of making a high power laser source with laser diode and laser beam guide means in front of said laser diode,
characterized by

- manufacturing a front facet on said laser diode with a selected reflectivity R_F towards said guide means,
- manufacturing at least one reflector with a selected reflectivity R_{FBG},

- said reflectivities R_{FBG} and R_F being chosen to achieve a predetermined relative feedback

$$r_{FB} = k * R_{FBG} / R_F > 1,$$

wherein k is determined by the coupling efficiency within said guide means.

29. The method according to claim 28, *whereby*
- the at least one reflector with a selected reflectivity R_{FBG} is manufactured within said laser beam guide means.

30. The method according to claim 28, *whereby*
- the manufacturing of the reflector is carried out by UV exposure creating said reflector as fiber Bragg grating in an optical fiber constituting part of the laser beam guide means.